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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/566,431	08/10/2006	William Ted Masselink	3367-101	5759
6449 7590 12/30/2009 ROTHWELL, FIGG, ERNST & MANBECK, P.C. 1425 K STREET, N.W. SUITE 800 WASHINGTON, DC 20005				
EXAMINER REAMES, MATTHEW L.				
ART UNIT 2893		PAPER NUMBER		
NOTIFICATION DATE 12/30/2009		DELIVERY MODE ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO-PAT-Email@rfem.com

### Office Action Summary

**Application No.**

10/566,431

**Applicant(s)**

MASSELINK ET AL.

**Examiner**

Matthew Reames

**Art Unit**

2893

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 29 September 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 14-30 is/are pending in the application.
- 4a) Of the above claim(s) 28-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2009 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-06)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/29/2009 has been entered.

***Election/Restrictions***

2. Newly submitted claims 28-30 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

- I. Claims 14-27, drawn to a quantum well structure, classified in class 257, subclass 9.
- II. Claims 28-30, drawn to a method of making a quantum well, classified in class 438, subclass 1+.

3. Inventions I and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case invention I can be using an interband structure as opposed to an interband (claim 14) moreover the device as claimed does not have to

absorb or emit electrons it could use the quantum well structure to move electrons a HEMT (claim 27).

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 28-30 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

***Response to Amendment***

4. The declaration by William Masselink under 37 CFR 1.132 filed 9/29/2009 is insufficient to overcome the rejection of claim 14 based upon Holonyak as set forth in the last Office action because:

a. Dr. Masselink states that the the nanostructures do not influence the energy of the electrons in the quantum wells. This is not found convincing since there inherently will be some influence. Moreover Dr. Masselink does not state there will be no influence just that there is not a "substantial influence." It is unclear what constitutes a "substantial influence." Since the structure of Holonyak is same as claimed by applicant it will have the same behavior.

b. Dr. Masselink further states that the reason the quantum dots of Holonyak have a lower band gap is because the are InAs which has lower bandgap than any other material listed. This is not found convincing since applicant acknowledges they are also using InAs or InP (as Holonyak, see e.g. page 7 of applicant specification) Therefore the structure will have the same properties.

c. Dr. Masselink further states that the device is configured so that carriers are not collected in the nanostructures. It is unclear how applicant is accomplishing this since the claim/disclosed structure is the same as Holonyak and the InAs/InP have a much lower band gap than the surrounding material.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 14-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

a. As to claim 14, the phrase without substantially influencing energy values in said quantum well layer is unclear since it is unclear what the structure energy value is being compared to. Moreover applicant does not teach how substantial is substantial.

b. As to claim 27, it is unclear if the means for absorbing or emitting photons is different than the quantum well. Applicant only teaches the quantum well therefore it appears to be double inclusion. Regardless applicant never states in the specification the means for absorbing or emitting photons in the specification thus it is unclear. Further the phrase without substantially influencing energy values in said quantum well layer is unclear since it is unclear what the structure energy value is being compared to. Moreover applicant does not teach how

substantial is substantial. Further still it is unclear if the nanostructures are different than the means for cancelling or modulating,, based on the specification they are the same thing and thus this appear to be doubling included.

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 14-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Holonyak (2003/0059998).

- a. As to claim 14, Holonyak teaches A quantum well structure for the absorption or emission of photons comprising a quantum well layer (see e.g. item 850 and figure 13) arranged stacked in a stacking direction between two barrier layers (see e.g. items 820, 825,835,865,875, and 880), wherein at least one of the barrier layers (see e.g. items 825, 865) comprises nanostructures (see e.g. item 825, 865) which cancels or modulate a lateral homogeneity of the barrier layer (this is inherent to structure), which is present without the nanostructures (again this is inherent to the structure), arranged such that said nanostructures cancel or modulate homogeneity of said quantum well layer extending in at least one lateral direction in the absence of said nanostructures, without substantially influencing energy values in said quantum well characterized in that the quantum

well layer (see e.g. figure 13 QW) is in the form of an absorption or emission layer for the absorption or emission of the photons ( see e.g. fig. 8 and 13), and wherein said at least one lateral direction extend perpendicularly to a stacking direction of said layer (see e.g. figure 8 and 13). The phrase configured such that after emission of a photon from an electron, said electron goes to a high energy to a low energy value in a quantum well layer and such that after absorption of a photon by an electron, said electron originates in a low energy level in a quantum well is intended use of the structure since the structure of Holonyak is capable of perform such action it Hyonak anticipates the claim limitation.

b. As to claim 15, Holonyak teaches a well with different energy level (see e.g. fig. 9 and figure 13) therefore enabling different wavelengths to absorbed or emitted.

c. As to claim 16, Holonyak teaches InGaAs which is capable self organized behavior, and quantum dots are inherently three dimensional. "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

d. As to claim 17, Holonyak teaches InP quantum dots and InAlGaP barriers (see e.g. paragraph 42) InAlGaP inherently has a greater lattice constant than InP.

McGill (2004/0099872) teaches InP has a greater lattice constant than InAlGaP (see e.g. figs. 1-3). Therefore the structure of Hoyonak inherently posses the claimed feature.

e. As to claim 18, Holonyak teaches quantum dots (see abstract).

f. As to claim 19, applicant describes quantum wires as being markedly greater in one direction. However, applicant has given no measure of what constitutes markedly. Therefore, some of Holonyak's dots will be inherently be longer than others making them quantum wires due to randomization and fluctuations in processing steps.

g. As to claims 20-21 , Holonyak teaches InAs quantum dots in AlGaAs or InGaP (see e.g. paragraph 32).

h. As to claim 22, Holonyak teaches a plurality of quantum wells which must be separated by a barrier to function as two wells (see e.g. claim 25).

i. As to claim 23, Holonyak teaches wherein the dot in every direction is less than 50 nm ( see e.g. paragraph 13).

j. As to claim 24, Holonyak teaches where the quantum well is 7 nm (see e.g. paragraph 42).

k. As to claim 25. Holonyak teaches a photodetector (see e.g. claim 23).



I. As to claim 27, Holonyak teaches a quantum well layer having different energy values (see e.g. figure 9 and 13 each quantum well has a plurality of energy levels); the quantum well are a means for absorbing or emitting photons from an electron undergoing a intersubband transistion in said quantum wells (see e.g. QW layers); means for cancelling or modulating homogeneity of electron density distribution in said quantum well layer without substantially influencing said energy values of the quantum well layer (see e.g. quantum dot layers inherently capable of performing the same action); wherein the quantum well layers are stacked in a stacking direction between barrier layers (see e.g. figures 8, 9 and 13); wherein the means for cancelling or modulating are in the barrier layers and are nanostructures configured to cancel or modulate the homogeneity of the electron distribution extending in at least on direction perpendicular to the stacking direction of said quantum well layer in the absence of said nanostructures ( see e.g. quantum dot layer which inherently have the property).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Faist (IEEE cited on IDS) in view Hoyonak.

a. Faist teaches Quantum cascade laser. Faist does not teach the quantum well structure of claim 14.

Hoyonak teaches the structure of claim 14. Hoyonak further teach these dots can be used a source of carriers.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have used the quantum well structure of Hoyonak as a quantum cascade laser.

One would have been so motivated to optimize emission (see e.g. paragraph 6) and as a supply of carrier (see e.g. paragraph 11).

#### ***Response to Arguments***

5. Applicant's arguments filed 9/29/2009 have been fully considered but they are not persuasive. Applicant Declaration fails to show how the structure of Holonyak is different then applicant's structure. Since the structure of Holonyak is the same as applicant's claimed and disclosed there is either something missing from applicant's disclosure or the structure of Holonyak has the same properties as applicant's structure.

#### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew Reames whose telephone number is (571) 272-2408. The examiner can normally be reached on M-Th 6:00 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Davienne Monbleau can be reached on (571)272-1945. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/MLR/

/Davienne Monbleau/

Supervisory Patent Examiner, Art Unit 2893